purified nitrogen. For field testing, *zero gas* may include ambient air.

[70 FR 40516, July 13, 2005, as amended at 73 FR 37346, June 30, 2008; 73 FR 59342, Oct. 8, 2008; 74 FR 8428, Feb. 24, 2009; 74 FR 56518, Oct. 30, 2009; 75 FR 23058, Apr. 30, 2010; 76 FR 57467, Sept. 15, 2011]

§ 1065.1005 Symbols, abbreviations, acronyms, and units of measure.

The procedures in this part generally follow the International System of Units (SI), as detailed in NIST Special Publication 811, which we incorporate by reference in § 1065.1010. See § 1065.20 for specific provisions related to these conventions. This section summarizes the way we use symbols, units of measure, and other abbreviations.

(a) *Symbols for quantities.* This part uses the following symbols and units of measure for various quantities:

Symbol	Quantity	Unit	Unit symbol	Units in terms of SI base units
α	atomic hydrogen to carbon ratio.	mole per mole	mol/mol	1
A	area	square meter	m^2	m^2
A_0	intercept of least squares regression.			
A_1	slope of least squares regression.			
β	ratio of diameters	meter per meter	m/m	1
β	atomic oxygen to carbon ratio.	mole per mole	mol/mol	1
$C^{\#}$	number of carbon atoms in a molecule.			
d	Diameter	meter	m	m
DR	dilution ratio	mole per mol	mol/mol	1
ε	error between a quantity and its reference.			
e	brake-specific emission or fuel consumption.	gram per kilowatt hour.	g/(kW·hr)	$g \cdot 3.6^{-1} \cdot 10^{6} \cdot m^{-2} \cdot kg \cdot s^{2}$
F	F-test statistic			
f	frequency	hertz	Hz	s^{-1}
f_n	angular speed (shaft).	revolutions per minute.	r/min	$2 \cdot \pi \cdot 60^{-1} \cdot\ m \cdot m^{-1x} \cdot s^{-1}$
γ	ratio of specific heats.	(joule per kilogram kelvin) per (joule per kilogram kelvin).	(J/(kg·K))/(J/(kg·K))	1
K	correction factor			1
l	length	meter	m	m
μ	viscosity, dynamic	pascal second	Pa·s	$m^{-1} \cdot kg \cdot s$
M	molar mass[1]	gram per mole	g/mol	$10^{-3} \cdot kg \cdot mol^{-1}$
m	mass	kilogram	kg	kg
$\dot{m}$	mass rate	kilogram per second	kg/s	$kg \cdot s^{-1}$
ν	viscosity, kinematic	meter squared per second.	m^{-2}/s	$m^{-2} \cdot s^{-1}$
N	total number in series.			
n	amount of substance.	mole	mol	mol
$\dot{\eta}$	amount of substance rate.	mole per second	mol/s	$mol \cdot s^{-1}$
P	power	kilowatt	kW	$10^{3} \cdot m^{2} \cdot kg \cdot s^{-3}$
PF	penetration fraction			
p	pressure	pascal	Pa	$m^{-1} \cdot kg \cdot s^{-2}$

Symbol	Quantity	Unit	Unit symbol	Units in terms of SI base units
ρ	mass density	kilogram per cubic meter.	kg/m^3	$kg \cdot m^{-3}$
r	ratio of pressures	pascal per pascal	Pa/Pa	1
R^2	coefficient of determination.			
Ra	average surface roughness.	micrometer	μm	10^{-6} m
Re#	Reynolds number			
RF	response factor			
RH	*relative humidity*			
σ	non−biased standard deviation.			
S	*Sutherland constant*	*kelvin*	*K*	*K*
SEE	standard estimate of error.			
T	absolute temperature.	kelvin	K	K
T	Celsius temperature	degree Celsius	°C	K − 273.15
T	torque (moment of force).	newton meter	N·m	$m^{-2} \cdot kg \cdot s^{-2}$
t	time	second	s	s
Δt	time interval, period, 1/frequency.	second	s	s
V	volume	cubic meter	m^3	m^3
$\dot{V}$	volume rate	cubic meter per second.	m^3/s	$m^3 \cdot s^{-1}$
W	work	kilowatt hour	kW·hr	$3.6 \cdot 10^{-6} \cdot m^2 \cdot kg \cdot s^{-2}$
w_c	*carbon mass fraction.*	*gram per gram*	*g/g*	*1*
x	amount of substance mole fraction [2].	mole per mole	mol/mol	1
$\bar{x}$	flow-weighted mean concentration.	mole per mole	mol/mol	1
y	generic variable			

[1] See paragraph (f)(2) of this section for the values to use for molar masses. Note that in the cases of NO_X and HC, the regulations specify effective molar masses based on assumed speciation rather than actual speciation.

[2] Note that mole fractions for THC, THCE, NMHC, NMHCE, and NOTHC are expressed on a C_1 equivalent basis.

(b) *Symbols for chemical species.* This part uses the following symbols for chemical species and exhaust constituents:

Symbol	Species
Ar	argon.
C	carbon.
CH_4	methane.
C_2H_6	ethane.
C_3H_8	propane.
C_4H_{10}	butane.
C_5H_{12}	pentane.
CO	carbon monoxide.
CO_2	carbon dioxide.
H	atomic hydrogen.
H_2	molecular hydrogen.
H_2O	water.
He	helium.
^{85}Kr	krypton 85.
N_2	molecular nitrogen.
NMHC	nonmethane hydrocarbon.
NMHCE	nonmethane hydrocarbon equivalent.
NO	nitric oxide.
NO_2	nitrogen dioxide.
NO_X	oxides of nitrogen.
N_2O	nitrous oxide.
NOTHC	nonoxygenated hydrocarbon.
O_2	molecular oxygen.
OHC	oxygenated hydrocarbon.
^{210}Po	polonium 210.
PM	particulate mass.
S	sulfur.
SO_2	sulfur dioxide.
THC	total hydrocarbon.
ZrO_2	zirconium dioxide.

(c) *Prefixes.* This part uses the following prefixes to define a quantity:

Symbol	Quantity	Value
μ	micro	10^{-6}

Symbol	Quantity	Value
m	milli	10^{-3}
c	centi	10^{-2}
k	kilo	10^{3}
M	mega	10^{6}

(d) *Superscripts.* This part uses the following superscripts to define a quantity:

Superscript	Quantity
overbar (such as $\bar{y}$)	arithmetic mean.
overdot (such as $\dot{y}$)	quantity per unit time.

(e) *Subscripts.* This part uses the following subscripts to define a quantity:

Subscript	Quantity
abs	absolute quantity.
act	actual condition.
air	air, dry.
atmos	atmospheric.
cal	calibration quantity.
CFV	critical flow venturi.
cor	corrected quantity.
dil	dilution air.
dexh	diluted exhaust.
exh	raw exhaust.
exp	expected quantity.
hi,idle	condition at high − idle.
i	an individual of a series.
idle	condition at idle.
in	quantity in.
init	initial quantity, typically before an emission test.
j	an individual of a series.
max	the maximum (*i.e.,* peak) value expected at the standard over a test interval; not the maximum of an instrument range.
meas	measured quantity.
out	quantity out.
part	partial quantity.
PDP	positive − displacement pump.
ref	reference quantity.
rev	revolution.
sat	saturated condition.
slip	PDP slip.
span	span quantity.
SSV	subsonic venturi.
std	standard condition.
test	test quantity.
test,alt	alternate test quantity.
uncor	uncorrected quantity.
zero	zero quantity.

(f) *Constants.* (1) This part uses the following constants for the composition of dry air:

Symbol	Quantity	mol/mol
x_{Arair}	amount of argon in dry air	0.00934
x_{CO2air}	amount of carbon dioxide in dry air.	0.000375
x_{N2air}	amount of nitrogen in dry air	0.78084
x_{O2air}	amount of oxygen in dry air	0.209445

(2) This part uses the following molar masses or effective molar masses of chemical species:

Symbol	Quantity	g/mol (10^{-3} kg·mol^{-1})
M_{air}	molar mass of dry air[1]	28.96559
M_{Ar}	molar mass of argon	39.948
M_{C}	molar mass of carbon	12.0107
M_{C3H8}	molar mass of propane	44.09562
M_{CH4}	molar mass of methane	16.043
M_{CO}	molar mass of carbon monoxide	28.0101
M_{CO2}	molar mass of carbon dioxide	44.0095
M_{H}	molar mass of atomic hydrogen	1.00794
M_{H2}	molar mass of molecular hydrogen	2.01588
M_{H2O}	molar mass of water	18.01528
M_{He}	molar mass of helium	4.002602
M_{N}	molar mass of atomic nitrogen	14.0067
M_{N2}	molar mass of molecular nitrogen	28.0134
M_{NMHC}	effective molar mass of nonmethane hydrocarbon[2]	13.875389
M_{NMHCE}	effective molar mass of nonmethane equivalent hydrocarbon[2]	13.875389
M_{NOx}	effective molar mass of oxides of nitrogen[3]	46.0055
M_{N2O}	molar mass of nitrous oxide	44.0128
M_{O}	molar mass of atomic oxygen	15.9994
M_{O2}	molar mass of molecular oxygen	31.9988
M_{S}	molar mass of sulfur	32.065
M_{THC}	effective molar mass of total hydrocarbon[2]	13.875389
M_{THCE}	effective molar mass of total hydrocarbon equivalent[2]	13.875389

[1] See paragraph (f)(1) of this section for the composition of dry air.
[2] The effective molar masses of THC, THCE, NMHC, and NMHCE are defined by an atomic hydrogen-to-carbon ratio, α, of 1.85.
[3] The effective molar mass of NO_X is defined by the molar mass of nitrogen dioxide, NO_2.

(3) This part uses the following molar gas constant for ideal gases:

Symbol	Quantity	J/(mol) · K) ($m^2 \cdot kg \cdot s^{-2} \cdot mol^{-1} \cdot K^{-1}$)
R	molar gas constant	8.314472

(4) This part uses the following ratios of specific heats for dilution air and diluted exhaust:

Symbol	Quantity	[J/(kg·K)]/ [J/(kg·K)]
γ_{air}	ratio of specific heats for intake air or dilution air.	1.399
γ_{dil}	ratio of specific heats for diluted exhaust.	1.399
γ_{exh}	ratio of specific heats for raw exhaust.	1.385

(g) *Other acronyms and abbreviations.* This part uses the following additional abbreviations and acronyms:

ASTM American Society for Testing and Materials
BMD bag mini-diluter
BSFC brake-specific fuel consumption
CARB California Air Resources Board
CFR Code of Federal Regulations
CFV critical-flow venturi
CI compression-ignition
CITT Curb Idle Transmission Torque
CLD chemiluminescent detector
CVS constant-volume sampler
DF deterioration factor
ECM electronic control module
EFC electronic flow control
EGR exhaust gas recirculation
EPA Environmental Protection Agency
FEL Family Emission Limit
FID flame-ionization detector
GC gas chromatograph
GC–ECD gas chromatograph with an electron-capture detector
GC–FID gas chromatograph with a flame ionization detector
IBP initial boiling point
ISO International Organization for Standardization
LPG liquefied petroleum gas
NDIR nondispersive infrared
NDUV nondispersive ultraviolet
NIST National Institute for Standards and Technology
NMC nonmethane cutter
PDP positive-displacement pump
PEMS portable emission measurement system
PFD partial-flow dilution
PMP Polymethylpentene
pt. a single point at the mean value expected at the standard.
PTFE polytetrafluoroethylene (commonly known as Teflon™)
RE rounding error
RESS rechargeable energy storage system
RMC ramped-modal cycle
RMS root-mean square
RTD resistive temperature detector
SSV subsonic venturi
SI spark-ignition
UCL upper confidence limit
UFM ultrasonic flow meter
U.S.C. United States Code

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§ 1065.1010 Reference materials.

The materials listed in this section are incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, a document must be published in the FEDERAL REGISTER and the material must be available to the public. All approved materials are available for inspection at the Air and Radiation Docket and Information Center (Air Docket) in the EPA Docket Center (EPA/DC) at Rm. 3334, EPA West Bldg., 1301 Constitution Ave. NW., Washington, DC. The EPA/DC Public Reading Room hours of operation are 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number of the EPA/DC Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742. These approved materials are also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741–6030 or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* In addition, these materials are available from the sources listed below.

(a) *ASTM materials.* Copies of these materials may be obtained from ASTM International, 100 Barr Harbor Dr., P.O.